Dietary Factors and Cancer in Israel

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Summary

The risk of developing cancer is relatively higher in the European-born Israeli population than in those originating from the Middle Eastern or North African countries. The majority of cancer sites with a higher risk in the European group involve the gastrointestinal and reproductive systems. Certain leads suggest that at least some of these differences may be attributed to diet. Data based on case-control studies are provided; they indicate a high consumption of starches among gastric cancer patients and a lower fiber consumption in patients with cancer of the colon. The latter observations may be extended to cancer of the breast, ovary, and corpus uteri, assuming an interplay between the concentration of bile degradation products and hormone metabolism. Although a low fiber consumption seems a more likely mechanism, a higher fat consumption is also compatible with this model. However, due to the complexity of human nutrition, it seems unwarranted to incriminate any single dietary factor in carcinogenesis. A better understanding of the metabolic pathways, coupled with consistent observations from distinct populations, should be looked for.

The heterogeneous composition of the Israeli population has provided a quite clear demarcation of high- and low-risk cancer groups, which may provide certain leads to the role of environmental factors in carcinogenesis. In this report, an attempt will be made to correlate the descriptive data with the limited observations thus far available on dietary factors in cancer etiology.

Incidence Studies

Table 1 presents a listing of the cancer sites for which a meaningful difference in risk exists between European-born and Asian- or African-born Israelis. The data are based on nationwide morbidity studies performed in our department (7, 14, 24, 25, 27, 29-33, 36) and reports of the Israel Central Cancer Registry (10, 35). The table is limited to foreign-born Jews only, because of the small population size of Arabs and native Jews in older age groups. The reasons for the varying incidence between the ethnic groups are mostly obscure, with the possible exception of malignant melanoma, where a difference in skin pigmentation may play a significant role in differential etiology. However, a majority of sites for which the risk is relatively higher in the European-born group involve the gastrointestinal and the reproductive systems. Certain leads suggest that at least some of these risk differences may be attributed to diet.

Dietary Studies of Gastrointestinal Cancer

Table 2 summarizes the main findings obtained in 2 recent case-control dietary studies of gastrointestinal cancer carried out by us (26, 28). Patients and 1 control group, comprising patients operated on for a nonmalignant, nongastrointestinal disorder, were selected from the surgical wards of 6 hospitals in the Tel Aviv area. A 2nd control group, consisting of persons living in the same neighborhood, was defined through national voting files. Each control was matched to the cancer case on age, sex, ethnic origin, and length of residence in Israel.

Information regarding dietary habits up to 1 year preceding the diagnosis of current illness was obtained by a personal interview. Food consumption was indirectly quantified by the frequency of consumption of each food item. There were 166 cases with gastric cancer, 198 cases with cancer of the colon, and 77 cases with rectal cancer. Sixty-seven percent of the patients in the gastric group and 55% in the colorectal group were males, 86% were European born, and 60% of the total had immigrated to Israel before 1950.

The data show a higher consumption of starches in gastric cancer, a lower consumption of fiber in colon cancer, and lack of association with any dietary agent in rectal cancer. Since the 3 sites were studied concurrently by the same method, these results seem to indicate varying etiology in the main cancer sites along the gastrointestinal tract. This is in line with descriptive studies that have demonstrated distinct epidemiological patterns for these disorders, such as geographical distribution, sex ratio, and secular trends (8, 22).

Detailed inspection of the data demonstrated that the differences between the cases and controls were spread out between individuals and not due to a few very large intrapair differences in both gastric and colon cancer. Further analysis revealed that the increased consumption frequency of starches in the gastric cancer patients and the decreased intake of fiber in colon cancer were an overall trend for these food groups and not limited to any particular sub-group or food item. The higher consumption of starches is in line with previous observations of a higher consumption of cereals or potatoes (11, 13, 34) among patients with gastric cancer, but the causal effect of the latter could be questioned in view of the association of this disease with lower

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2 Established investigator of Chief Scientist's Bureau, Ministry of Health, Israel.
3 Presenter.
sites with higher risk in European and American born males and females compared to Asian and African born males and females. Table 1 shows the relative high-risk cancer sites by major ethnic origin and sex. The data are based on studies referred to in the text and data of the Central Cancer Registry. Sites have been considered as high risk if age-adjusted rates were at least 50% higher than the world population (standardization).

- Sites with higher risk in European and American born males:
  - Lip
  - Salivary gland
  - Stomach
  - Small intestine
  - Colon
  - Rectum
  - Pancreas
  - Breast
  - Testis
  - Kidney
  - Melanoma
  - Brain
  - Leukemia

- Sites with higher risk in Asian and African born males:
  - Nasopharynx
  - Liver
  - Larynx
  - Cervix

- Sites with higher risk in European and American born females:
  - Lip
  - Tongue
  - Salivary gland
  - Stomach
  - Nasopharynx
  - Liver
  - Corpus uteri
  - Ovary
  - Kidney
  - Melanoma
  - Eye
  - Brain

The theoretical basis for an association between starch consumption and gastric cancer remains open to speculation. On the other hand, the lower frequency of fiber consumption in patients with cancer of the colon is not due to the higher incidence of this disorder in high socioeconomic groups, where certain high-fiber foods may be less frequently consumed.

Hypotheses Concerning Other Cancer Sites

Although direct evidence is not yet available, circumstantial evidence implicates diet in the role of other types of cancer as well. Consequently, differential dietary patterns may contribute to a certain extent to the relatively higher risk of some of the cancer sites enumerated above in the European-born Israeli subjects, compared with those of Asian and African extraction. Perhaps the most intriguing lead is the striking similarity in the population distribution of breast and colon cancer, which suggests a common etiological and pathogenetic mechanism. Additional supportive evidence for a possible role of diet in breast cancer is provided by the differential age-specific incidence curve in high- and low-risk populations. In this context, the Israeli data (33, 35) are in line with those reported for other places (2, 9, 23).

Decreased fiber intake does not necessarily provide the sole explanation for a dietary factor in the etiology of any of the above-mentioned neoplasms in developed society. A higher fat consumption as suggested by other investigators (6, 12, 18, 20) may be explained through a similar model.
Table 2

Summary of significant differences in consumption of major food group in cancer cases and controls, by site

For source of data, see Refs. 26 and 28.

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of case-control pairs</th>
<th>Food groups consumed more frequently, compared to both control groups</th>
<th>Food groups consumed less frequently, compared to both control groups</th>
<th>No. of items in group consumed more frequently</th>
<th>No. of items in group consumed less frequently</th>
<th>( p ) (matched pairs)</th>
<th>( p ) (items)</th>
</tr>
</thead>
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